

## On Four Polycystid Gregarines from the Intestine of *Tribolium ferrugineum* F.

By

S. Ishii, *Rigakushi*.

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*With 4 Figures.*

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In the intestine of the beetle, *Tribolium ferrugineum* F., I have found four polycystid gregarines, of which one is referable to the already known species *Gregarina cuneata* F. STEIN, while the remaining three are forms apparently not yet described. The host beetles were collected in the Province of Izu in the early part of October last year.

### 1. *Gregarina cuneata* F. STEIN. (Fig. 1).

- 1848, F. STEIN, *Gregarina cuneata*: Arch. Anat. Physiol. Med.  
1875, AIMÉ SCHNEIDER, *Clepsidrina polymorpha* var. *Clepsidrina cuneata* (STEIN): Arch. Zool. Exp., tom. 4.  
1899, A. LABBÉ, *Gregarina polymorpha cuneata* F. STEIN: Sporozoa.  
1902, BERNDT, *Gregarina cuneata*: Arch. f. Protistenk., Bd. 1.  
1904, LÉGER et DUBOSCQ, *Gregarina cuneata* F. ST.: Arch. f. Protistenk., Bd. 4.

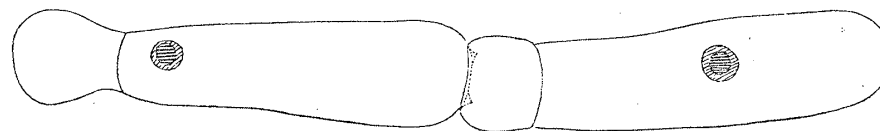


Fig. 1. *Gregarina cuneata* in syzygy. 360 $\times$ .

The larger sporonts are usually associated in syzygy; the smaller ones solitary. The infection is generally not heavy, but pretty common.

## 2. *Gregarina minuta* sp. nov. (Fig. 2).

The larger sporonts are usually in association, the smaller ones often solitary.

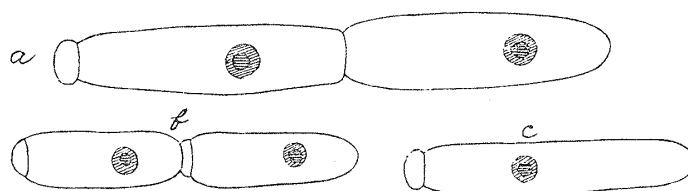


Fig. 2. *Gregarina minuta* n. sp.

*a*, A large syzygy with satellite lacking protomerite. *b*, A small syzygy.  
*c*, A solitary sporont. All 360x.

Protomerite ovoid, sometimes more or less half-moon-shaped, broader than long. It is not large, especially so in the satellite, in which it is not infrequently hidden from view, being entirely imbedded in the deutomerite of the primite.

Deutomerite elongate, cylindrical, rounded posteriorly. Between the two segments of the body there is usually a distinct constriction.

Epicyte thin, rigid. Sarcocyte thin all over the body. Septal region not thick. Endocyte not dense, almost clear in appearance.

Nucleus large, spherical, usually situated near the middle of deutomerite, clearly visible in living animals in both primite and satellite. Karyosome single, large, spherical.

Cyst small, spherical.

Measurements:

Larger association:

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Primitive	{	Length of protomerite,	8 $\mu$ .
		Breadth of protomerite,	14 $\mu$ .
		Length of deutomerite,	92 $\mu$ .
		Breadth of deutomerite,	24 $\mu$ .
		Total length,	100 $\mu$ .
Satellite	{	Length of deutomerite,	88 $\mu$ .
		Breadth of deutomerite,	26 $\mu$ .
		Protomerite absent.	
Total length of the association,			188 $\mu$ .

## Smaller association:

Primitive	{	Length of protomerite,	6 $\mu$ .
		Breadth of protomerite,	11 $\mu$ .
		Length of deutomerite,	52 $\mu$ .
		Breadth of deutomerite,	19 $\mu$ .
		Total length,	58 $\mu$ .
Satellite	{	Length of protomerite,	4 $\mu$ .
		Breadth of protomerite,	8 $\mu$ .
		Length of deutomerite,	56 $\mu$ .
		Breadth of deutomerite,	20 $\mu$ .
		Total length,	60 $\mu$ .
Total length of the association,			118 $\mu$ .

## Solitary sporonts:

Length of protomerite,	5-8 $\mu$ .
Length of deutomerite,	22-112 $\mu$ .
Breadth of body,	6-28 $\mu$ .
Total length of body,	27-120 $\mu$ .
Diameter of cysts,	36-48 $\mu$ .

Many sporonts, sometimes in association, were found dead in the faeces of the host. They were usually unchanged in form, but sometimes greatly emaciated and wrinkled.

Infection usually not heavy, nor common.

This form greatly resembles *Gregarina polymorpha* (HAMMER-SCHMIDT), but differs from it in being generally smaller, in the frequent absence of protomerite in the satellite, and in the spherical shape of cysts. In *G. polymorpha*, so far as I know, the protomerite is always present and the cyst is of an oval shape.

3. *Gregarina crassa* sp. nov. (Fig. 3).

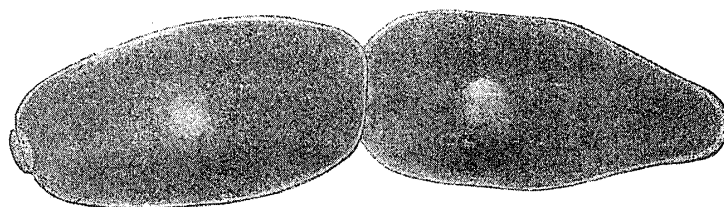


Fig. 3. *Gregarina crassa* n. sp. 360x.

Sporonts usually in association.

Protomerite ovoid, relatively very small, always broader than long, usually not visible in satellite.

Deutomerite also ovoid, very large, rounded posteriorly. Satellite with posterior part of deutomerite usually somewhat narrowed. Between the two segments of body there exists a distinct constriction.

Epicyte thin, especially so in protomerite. Sarcocyte very thin all over, being not much thicker than epicyte. Septal region not thick, inconspicuous. Endocyte almost clear in protomerite, with only a few number of granules; but very dense in deutomerite, giving it a dark brownish black colour.

Nucleus usually situated near the middle of deutomerite. It is only vaguely visible owing to the great denseness of the endocyte.

Measurements:

Average association :

Primite	{	Length of protomerite,	6 $\mu$ .
		Breadth of protomerite,	16 $\mu$ .
		Length of deutomerite,	112 $\mu$ .
		Breadth of deutomerite,	64 $\mu$ .
		Total length,	118 $\mu$ .
Satellite	{	Length of deutomerite,	124 $\mu$ .
		Breadth of deutomerite,	60 $\mu$ .
		Protomerite absent.	
Total length of the association,			242 $\mu$ .

Solitary sporonts:

	A	B
Length of protomerite,	6 $\mu$ .	8 $\mu$ .
Length of deutomerite,	112 $\mu$ .	92 $\mu$ .
Breadth of body,	60 $\mu$ .	52 $\mu$ .
Total length of body,	118 $\mu$ .	100 $\mu$ .

In one case I have found a free sporont which was apparently without protomerite. It was slightly narrower at one end of the body. Probably I had only a detached satellite before me.

Infection not heavy, nor common.

This form resembles in some points *Gregarina Steini* which was described by BERNDT<sup>1)</sup> from the intestine of *Tenebrio molitor*, but differs from this in the much smaller protomerite, in the thicker deutomerite, and in the frequent absence of protomerite in the satellite.

#### 4. *Steinina obconica* sp. nov. (Fig. 4).

In trophic stages always solitary.

Epimerite not deciduous, somewhat conical in shape, small and short, having an average length of only 6  $\mu$ . On several occasions

1) BERNDT, A.—“Beitrag zur Kenntniss der im Darne der Larve von *Tenebrio molitor* lebenden Gregarinen.” Arch. f. Protistenk., Bd. 1., 1902.

I have observed the animal attached to the epithelium of host intestine by the small epimerite.<sup>1)</sup>

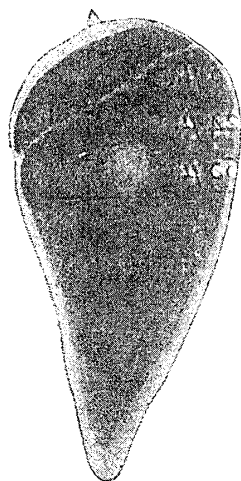


Fig. 4.

*Steinina obconica* n. sp.

A cephalont. 360x.

Protomerite half-moon-shaped, more or less compressed antero-posteriorly, always broader than long.

Deutomerite rather obconical, broadest close to the septum, narrowing posteriorly and ending with obtuse end; usually 3 or 4 times as long as the protomerite. The constriction between the two segments of body is in most cases not conspicuous, often nearly so obsolete as to obscure the distinction between protomerite and deutomerite.

Epicyte thin, especially so in protomerite. Sarcocyte thin near the septum, but thicker towards the posterior end of deutomerite; thick-end also along the anterior end of protomerite. Septum very thin, inconspicuous. Endocyte very dense and dark in both segments, lighter towards the posterior end of deutomerite evidently owing to the thinning of body.

Nucleus can not be clearly seen in living specimens, it being deeply imbedded among endocytic granules. It is situated usually in the broadest portion of deutomerite. In many cases the body is bent toward one side, giving rise to a shape remotely resembling that of a comma.

Cyst large, spherical or somewhat ovoid.

Measurements:

	A	B	C	D	E
Length of protomerite,	28 $\mu$ ,	28 $\mu$ ,	32 $\mu$ ,	24 $\mu$ ,	20 $\mu$ .
Length of deutomerite,	112 $\mu$ ,	112 $\mu$ ,	116 $\mu$ ,	80 $\mu$ ,	100 $\mu$ .

1) The so called "bouton aplati" of LÉGER et DUBOSCQ ("Nouvelles recherches sur les grégarines et l'épithélium intestinal des Trachéates," Arch. f. Protistenk., Bd. 4., 1904.) is likely something different from true epimerite.

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Breadth of body, 68  $\mu$ , 80  $\mu$ , 80  $\mu$ , 52  $\mu$ , 56  $\mu$ .

Total length of body  
(excepting epimerite), 140  $\mu$ , 140  $\mu$ , 148  $\mu$ , 104  $\mu$ , 120  $\mu$ .

Diameters of an average-sized cyst, 120  $\mu \times$  108  $\mu$ .

Infection not heavy, but pretty common.

This gregarine differs from *Steinina ovalis* (F. STEIN) in the peculiar shape of deutomerite, *i. e.*, in this being obconical instead of oval.<sup>1)</sup> Further, the two species differ in the shape of protomerite.

Tokyo, Nov. 7, 1913.

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1) Cf. LÉGER et DUBOSCQ, *op. cit.*